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EPA Superfund
Record of Decision Amendment:

KOPPERS CO., INC. (OROVILLE PLANT)
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AMENDMENT #1

to the

RECORD OF DECISION

for the

SOIL AND GROUND WATER OPERABLE UNIT

KOPPERS COMPANY, INC. SUPERFUND SITE
OROVILLE, CALIFORNIA

U.S. Environmental Protection Agency
Region 9
San Francisco, California

August 1996

Koppers ROD Amendment #1

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I. DECLARATION

SITE NAME AND LOCATION

Koppers Company, Inc.
Oroville, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the revised selected remedial action for contaminated soils at the Koppers Company, Inc. (Koppers) site in Oroville, California, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of California concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present and imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision (ROD) amends the previously selected remedy for soils at the Koppers site. The revisions affect both the cleanup standards and the cleanup technologies selected in the 1989 ROD for this site. The major components of the revised soil remedy are:

- Cleanup standards based on continued industrial use of the site;
- Excavation of contaminated surface soils and placement in a new on-site landfill;
- Excavation of subsurface soils in the former pole washer and creosote pond areas (including a small volume of principal threat waste) and placement of these soils in a new on-site landfill;
- Excavation of the former soil filtration bed and place in a new on-site landfill;
- Backfilling and grading the excavated areas; and
- Deed restrictions to prohibit future residential development (and other inappropriate uses) of the site.

This remedy addresses the risks to human health and the environment posed by the contaminated soils and debris at the site. As provided in the 1989 ROD, the cap in the process area will remain as an interim remedy for that area of the site so that the Koppers are accessible, this contaminated soil will be remediated to achieve the same cleanup standards selected in this ROD.

The excavation of subsurface soil in the former pole washer area will also enhance the ongoing ground water remedy by facilitating the removal of a significant volume of highly contaminated perched ground water.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate, and is cost-effective. This revised soil remedy utilizes containment rather than treatment technologies to address the wastes at the site. Because this remedy will result in hazardous substances remaining on-site above health-based levels, EPA shall conduct a review pursuant to Section 121(c) of CERCLA, 42 U.S.C. §9621, within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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Date

Keith Takata
Director, Superfund Division

II. DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The Koppers Company Superfund site is located in Butte County just south of the city limits of Oroville, California. The site comprises an operating, 200-acre wood-treating plant and an area primarily south of the plant defined by a plume of contaminated groundwater originating beneath the plant (see Figure 1-1). The Koppers plant itself lies in the floodplain about 3000 feet east of the Feather River, on the fringe of an area where dredge mining operations occurred in the early 1900s. The Koppers plant is bordered on the west by the Louisiana-Pacific Corp. facility, which is also a Superfund site.

Land use in the vicinity of the site is mixed industrial, commercial, agricultural, and residential. Residential areas are located primarily to the west (beyond the Louisiana-Pacific site) and south.

The geology underlying the site consists of gravels, sands and clays that were deposited by the Feather and ancestral Feather River systems. In the northern portion of the Koppers property, the soils have been disturbed by the dredge mining operations. Several interconnected aquifer zones have been defined on and off the site. The regional groundwater flow is generally to the south.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The site has been used for wood treatment operations since 1948. Koppers purchased the property in 1955 and has used a variety of chemical preservatives in its wood treating processes. Wood products including utility poles and railroad ties have been pressure-treated using chemicals that include pentachlorophenol (PCP), creosote, chromium and arsenic. Koppers discontinued the use of PCP in 1988.

Soil and groundwater contamination at the site have resulted from both wood treatment operations and related waste disposal practices. In addition, two process-related fires at the plant (in 1963 and 1987) released PCP and its associated combustion products, including dioxin, onto surrounding soils.

The State first identified the Koppers site as an environmental problem in the early 1970s. EPA placed the site on the National Priorities List (NPL) in 1984. Koppers began the Remedial Investigation (RI) in April 1986 and issued the RI report in July 1988. EPA completed the Endangerment Assessment, which evaluated risks to human health and the environment from contamination at the site, in November 1988. The original Feasibility Study (FS), which evaluated a wide range of soil and groundwater cleanup alternatives, was issued in May 1989, along with a proposed plan.

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In April 1987, an explosion and fire occurred at one of Koppers' pentachlorophenol wood treating processes. EPA issued a unilateral order requiring cleanup of fire debris and stabilization of surface soils. The chip seal cap placed over process area soils remains in place, and drummed fire debris is still stored at the site.

In September 1989, EPA selected soil and groundwater cleanup remedies for the Koppers site. EPA documented the selection of these remedies in an Operable Unit Record of Decision (ROD). The 1989 ROD divided the contaminated soils at the site into four different areas, or units, and selected a specific soil remedy for each unit (see Figure 2-1). EPA selected three innovative technologies as remedies for three of the soil units: in situ bioremediation, soil washing, and fixation. The capping remedy selected for the remaining soil unit was designated as an interim remedy that would eliminate exposure to contaminated soil while allowing Koppers to continue plant operations. The area of capped soils was to be cleaned up at a later date, when excavation of the soil would not disrupt plant operations.

The 1989 ROD selected risk-based cleanup goals for the following major contaminants of concern in site soils: pentachlorophenol, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), polychlorinated dibenzo-p-dioxins/dibenzofurans (referred to collectively in this ROD as either PCDD/PCDFs or dioxin), arsenic and chromium. The soil cleanup goals were set at a level that would allow future residential use of the site.

In January 1991, EPA issued and Explanation of Significant Differences (ESD) that clarified and made minor revisions to the 1989 ROD. The ESD changed the ROD to provide for separate cleanup standards for subsurface soil at the Site and to clarify the use of institutional controls as part of the selected remedy.

In February 1992, a consent decree between EPA and Beazer East, Inc. (which bought the former Koppers Company) was entered in federal district court. The decree requires Beazer to carry out remedial design/remedial action (RD/RA) work to implement the 1989 ROD. Because the three innovative soil cleanup technologies had not been tested at the site, the soil remedy has been implemented using a phased approach. In the initial phase, additional soil sampling was conducted and the ROD's soil remedies were evaluated using site-specific treatability studies. The results indicate that cleanup technologies were unsuccessful because they could not reduce contaminant levels to the residential cleanup standards and/or they could not effectively treat the combination of organic contaminants and metals typically present in soils at the site (see Table 2-1).

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In Situ Bioremediation

In a laboratory treatability study conducted during RD, bioremediation effectively reduced PCP levels in soil but was much less effective (i.e., could not achieve the cleanup goals) for cPAHs. Bioremediation also did not reduce the dioxin levels in the test soils, and it had no effect on metals (such as arsenic or chromium), which do not biodegrade. The in situ bioremediation pilot project was cancelled because dioxin levels in the test plots were found to be much higher than anticipated and the test plot area was excavated as part of the removal action.

Soil Washing

Soil washing was evaluated in a pilot project conducted at the site in November 1993, in which about 400 tons of soil were put through the soil washing unit. The process could not consistently meet cPAH and dioxin cleanup goals, though it showed better (but not fully successful) results in meeting the PCP cleanup goal. There was also no significant reduction in the overall volume of soil exceeding cleanup goals.

Fixation

In laboratory treatability studies, fixation was effective in reducing the mobility arsenic, chromium and other metals. Results were variable for organic contaminants such as PCP, cPAHs and dioxin. In general, a higher reagent concentration was required to achieve significant mobility reduction for the organic contaminants. Additional sampling indicates that most areas with metal-contaminated soils at the site, including the S-4 area, also have PCP, dioxin and/or cPAHs present.

<Table 2-1. Results of Initial Phase Treatability Studies>

As part of the capping remedy for soil unit S-3 (and to comply with new EPA regulations for wood treaters), drip pads for the process area were constructed in 1992. Contaminated soil excavated during construction of the pads was stockpiled in a new soil storage building at the site.

During initial sampling of the test plots for the S-1 bioremediation pilot project, unexpectedly high levels of dioxin were found in the surface soils, including levels exceeding the recommended limit for worker exposure. Because of the risk posed to current workers at the site, EPA directed Beazer to remove 15,000 cubic yards of dioxin-contaminated soil and place it in a newly-constructed on-site landfill. This removal action was completed in August 1995. The landfill was designed and constructed to meet the requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA).

Two groundwater treatment systems, one located at the Koppers plant and the other near the toe of the plume, have been constructed as part of the groundwater remedy.

3.0 COMMUNITY PARTICIPATION

The EPA has encouraged public participation throughout the RI/FS and remedial design/remedial action (RD/RA) stages of the project, in accordance with CERCLA requirements.

Fact sheets have been sent out to the public at key progress points in the investigation and cleanup of the site. Informational meetings and site tours have been held during the RD/RA phase, with representatives of public agencies and local citizen groups invited to attend. RD/RA documents, including the 1996 Site-Wide Soils Remedy Report, were sent to local libraries.

In December 1995, EPA issued a fact sheet describing its ongoing reevaluation of soil remedies. This fact sheet, which was mailed to all interested parties, described both the reconsideration of future land use scenarios for the site and the reevaluation of remedial alternatives for soils. The results of the bioremediation, soil washing and fixation treatability studies were discussed in the fact sheet. In addition, incineration, thermal desorption and landfilling were presented as technologies being considered to replace the unsuccessful innovative treatment technologies. The fact sheet encouraged the public to contact EPA with any comments or ideas regarding the reevaluation of soil cleanup.

Shortly after the fact sheet was issued, EPA's Remedial Project Manager met with elected officials and staff for both Butte County and the City of Oroville to discuss the reevaluation of soil remedies and solicit any comments they had on the issue. No specific concerns were expressed during those meetings, and representatives from the City's planning department indicated that continued industrial use of the site was consistent with the City's long range plans for the area. Two drop-in sessions for the public were also held in Oroville, and no specific concerns or objections were raised during those lightly-attended sessions.

Public participation requirements for EPA's selection of the final remedy as defined in CERCLA sections 113(k)(2)(B)(i-v) and 117(a) were met by the activities described below.

The proposed plan for the revised soil remedy was distributed using EPA's mailing list for this site. A public comment period on the proposed plan was held between April 2, 1996 and May 2, 1996. Public notice appeared in a local newspaper, the Chico Enterprise Record, prior to the start of the public comment period. A formal public meeting was held on April 16, 1996. A transcript of the meeting can be found in the Administrative Record for this site.

There were no written comments submitted during the public comment period, and no verbal comments were made during the April 16, 1996 public meeting. In a telephone conversation with a City of Oroville official toward the end of the comment period, EPA's Remedial Project Manager was told that the City had no objections to EPA's proposed change in the soil remedy.

4.0 SCOPE AND ROLE OF DECISION

The selected remedial action addresses contamination in on-site soils and debris at the Koppers plant. This action revises the soil remedy selected in the 1989 Operable Unit ROD.

Based on the results of treatability studies and additional site characterization work performed since the 1989 ROD was issued, EPA concluded that the previously selected soil cleanup remedies cannot achieve the 1989 ROD cleanup goals. The results of the initial phase work on each of the three cleanup technologies are discussed in detail in the Site-Wide Soils Remedy Report. In brief, the 1989 ROD's cleanup technologies were unsuccessful because they could not reduce contaminant levels to the residential cleanup standards and/or they could not effectively treat the combination of organic contaminants and metals typically present in soils at the site.

EPA is selecting containment in an on-site landfill as the revised soil remedy for the Koppers site. EPA is also changing the future use exposure scenario used to determine soil cleanup levels from residential to continued industrial use of the site. The revised soil remedy will reduce contamination to health protective levels consistent with continuing industrial exposures to these soils. As described in the 1989 ROD, soils beneath the capped portions of the process area will be addressed, consistent with the overall remedial objectives for the site, when these soils are accessible (i.e., when operations cease or when process equipment or structures are replaced). At that time, the soils will by further sampled to determine whether they are principal threat wastes (see Section 5.3); if so, EPA may require treatment of these soils prior to disposal in an on-site landfill cell.

In 1991, EPA issued and Explanation of Significant Differences (ESD) modifying and clarifying certain features of the 1989 ROD. The ESD stated that EPA would establish a separate set of cleanup standards for subsurface soil (defined as soil deeper than five feet) to ensure groundwater protection. Based on the Leachability and Degradation Study (contained in Appendix A of the Site-Wide Soils Remedy Report), EPA has identified two areas of the site with potential to impact groundwater: the former pole washer area and the former creosote pond area. The revised remedy involves removal of the potential source material in both areas as part of the soil cleanup. As a result, EPA does not currently plan to establish separate cleanup standards for subsurface soils.

The selected action addresses the documented potential threats from contaminated soil at the Koppers plant. No modifications to the groundwater remedy are being made at this time. The State of California is continuing its investigation of trace dioxin contamination in off-site soils and associated animal products. Since dioxin contamination has been documented on-site at Koppers, it is possible that Koppers site is a contributor to the off-site dioxin levels, although there are several potential sources. The outcome of the State's investigations may result in further actions regarding the Koppers site.

5.0 SUMMARY OF SITE CHARACTERISTICS

The 1989 ROD provided a detailed summary of site characteristics for both soil and groundwater based on data from the RI. The following discussion will therefore address only the additional data gathered during RD/RA and the extent to which they have changed the 1989 ROD's conclusions about soil contamination, soil conditions and contaminant migration at the site.

5.1 Nature and Extent of Contamination

The soils at the Koppers are contaminated with a variety of chemicals used in the wood treatment processes, including the F032, F034, and F035 wastes listed pursuant to 40 CFR Part 261 of the RCRA regulations. In addition, K001 wastes are present in the creosote pond area because the pond bottoms were never removed at the time the ponds were closed. The contaminants of concern in soils at the site are PCP, arsenic, chromium and carcinogenic polynuclear aromatic hydrocarbons (cPAHs), which are compounds found in creosote. In addition, polychlorinated dibenzo-p-dioxins/dibenzofurans (PCDD/PCDFs) are present in soils as a result of process fires and also because they were present as trace contaminants in the PCP used for wood treatment.

Additional sampling was conducted as part of remedial design activities to better define the physical characteristics of soils at the site as well as the distribution of contaminants within the three soil units (S-1, S-2, and S-4) where treatment technologies were to be used as part of the remedy. In addition, sampling conducted as part of the 1995 removal action provided significant data on the distribution of contaminant concentrations with depth.

These sampling activities, summarized in the Site-Wide Soils Remedy Report, showed that surface soils are typically contaminated with a mix of all of the contaminants of concern (with the exception of chromium, which rarely exceeds background levels). The additional soil sampling also showed that dioxin levels in surface soils outside of the process area were higher than anticipated. Contaminant concentrations in surface soils remaining at the site (i.e., not including those soils excavated during the recent removal action) are summarized in Table 5-1.

Table 5-1. Soil Contaminants of Concern (by soil unit), Post Removal Data, ≤ 5 ft bgs

	Detection Frequency				Range			
Compound	S1	S2	S3	S4	S1	S2	S3	S4
Organics								
PCP (mg/kg)	90/117	29/30	69/79		0.014 - >800	0.01 - 570	0.01 - 5,100	
Dioxin (µg/kg)	69/71	11/11	3/3	1/1	0.005 - 6.96	0.07 - 28.57	37.8 - 113.2	1.12
cPAHs TEQ	74/77	30/30	39/39		0.01 - 15.9	0.02 - 22.11	0.07 - 71.3	
Total cPAH (mg/kg)	73/75	30/30	39/39		0.078 - 108.4	0.086 - 86.5	0.05 - 390.2	
Inorganics								
Arsenic (mg/kg)	79/80	25/29	36/36	6/9	1.1 - 160	2.8 - 93	3.9 - 563	3.6 - 53
Chromium	80/80	30/30	36/36	9/9	29 - 151	76.7 - 224	52 - 620	48.2 - 137

Two of the contaminants of concern, arsenic and chromium, are also naturally occurring metals. During RD, detailed sampling was conducted to determine background levels in both dredge tailings and native (undisturbed) soils. The data showed that the difference in background levels between these two soil types was not significant, and background levels for all soils were set at 7.15 mg/kg for arsenic and 181 mg/kg for chromium.

Soil unit S-4 was described in the 1989 ROD as an area contaminated with arsenic and chromium. Although the RI documented several areas with arsenic concentrations above the expected background level, the S-4 area was defined on the basis of one sample with very high arsenic and chromium levels collected in an area where wood was stored after being treated with these chemicals. Subsequent sampling during RD found only moderately elevated levels of arsenic in the S-4 area (and in most areas where treated wood was stored). In addition, soils with elevated levels of arsenic or chromium also typically are contaminated with dioxin, cPAHs and/or PCP.

5.2 Soil Stratigraphy and Contaminant Migration

Data collected during RD and the 1995 removal action was combined with data from the RI to provide and improved definition of surface soil stratigraphy. The two most prevalent soil types at the site are (1) thin roadbase material underlain by native soils and (2) roadbase fill material underlain by dredge tailings. The roadbase material typically consists of dredge tailings (clayey gravels) which have been highly compacted by vehicle traffic. The upper portion of the roadbase material in the wood storage areas also contains wood splinters and fragments that slowly get ground into a wood dust by the heavy equipment used to transport treated wood into and out of these areas.

The surface layers of the roadbase material have low infiltration rates (approximately 10-4 cm/sec) while the material below the upper compacted layer has relatively rapid infiltration rates (10-1 to 10-2 cm/sec). The native soils have a lower permeability than the overlying roadbase material, while the dredge tailings have permeabilities similar to the lower roadbase material. The dredge tailings extend to depths of 20 feet, at which point native soils are encountered.

The depth of contaminated soil in treated wood drying/storage areas is typically limited to one foot because of the low permeability of the compacted roadbase material. The former pole washer is located primarily over dredge tailings and contaminants are found here at much greater depths. Although the creosote ponds were drained and backfilled in 1973, the contaminated pond bottoms are still present in the subsurface, at depths of up to eight feet.

5.3 Principal and Low Level Threat Wastes

The remaining soils to be addressed at the site were evaluated to determine whether any of them should be characterized as principal threat waste (i.e., source materials that are highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur). There is no fixed threshold level of toxicity/risk that is used to define principal threats. For the purpose of evaluating soils at the Koppers site, a potential risk of 10-3 (taking into account toxicity and mobility) was used as the basis for identifying principal threat wastes.

With the possible exception of the capped process areas, surface soils at the site are typically low-level threat wastes in terms of both toxicity and mobility. Contaminant levels in surface soils outside the capped process area are typically less than 2 orders of magnitude above the 10-5 acceptable exposure levels for workers (described below in Section 6). In addition, the most toxic compound, dioxin, is relatively immobile. There is one location near the creosote pond area where dioxin levels exceed the 10-3 risk threshold; however, there is no unique or distinctly different waste present at this location, and the result is considered to be an anomaly and not an indication that principal threat waste is present.

There is only limited data on the soils beneath the capped portions of the process area, and it is possible that some of these soils have dioxin levels that would exceed the 10-3 risk level.

Based on the limited data available from soil borings and test pits, the former creosote pond sediments have dioxin concentrations that exceed the 10-3 risk level. The layer of pond sediments is one to two feet thick, and it is present at depths of roughly six to eight feet below ground surface (bgs). The toxicity of these sediments is offset by the fact that they are highly immobile, and thus do not pose a significant threat in their current location. Nonetheless, these sediments may be considered principal threat waste solely on the basis of their toxicity. EPA's rationale for how this principal threat waste will be addressed is provided in Section 10.5.

6.0 SUMMARY OF SITE RISKS

In November 1988, EPA completed an Endangerment Assessment (EA), which examined the current and potential future risks to public health form contamination at the Koppers site. The EA used results from the Remedial Investigation (RI) to determine the contaminants of concern. The EA then determined the possible exposure pathways (that is, ways people could be exposed to contaminants now and in the future) and calculated the risks associated with those exposures. The assessment showed that contaminant levels in soil were too high to allow unrestricted use of the site. The highest risks from soil were associated with future residential use of the site.

Although the conclusions of the 1988 risk assessment are still generally valid, there have been some changes since then in how EPA conducts risk assessments and how EPA views the toxicity of some of the contaminants found at the Koppers site. For example, in 1988, EPA had not yet classified PCP as a carcinogen (it now has), and thus no cancer risk was calculated for exposure to PCP in soil. In 1988, all cPAHs were assumed to be equally toxic, whereas currently EPA assigns each cPAH a specific toxicity factor (relative to benzo(a)pyrene), similar to the way the toxicity of dioxin compounds is evaluated. Finally, the toxicity of dioxin is currently being reassessed by EPA, with indications that its non-carcinogenic effects on human health may be more significant than previously thought. The net result of these changes is that risk-based soil cleanup standards for residential use, if calculated today, would be different than the ones calculated in 1988.

The soil cleanup goals in the 1989 ROD are primarily health-based levels established based on the assumption that, in the future, the site might be developed for residential use. However, after further discussion with local officials, land use planning authorities and the public, it was apparent that continued industrial use of the site was consistent with local land use plans and more likely than future residential development. As a result, the reevaluation of soil remedies included the development of risk-based soil cleanup standards for the industrial worker exposure scenario.

The development of the revised standards is summarized below and discussed in detail in Appendix B (Reevaluation of Human Health Risks) of the Site-Wide Soils Remedy Report.

The potential exposure pathways for the on-site industrial worker are:

- Incidental ingestion of soil,
- Dermal contact with soil, and
- Inhalation of dust derived from soil.

For each of these pathways, risk-based remedial goals (RBRGs) for all contaminants except dioxin were back-calculated from a target excess cancer risk of one in 100,000 (or 1 x 10-5) and a hazard quotient of 1 for noncarcinogenic risks. The calculations relied upon a set of worker exposure factors for each pathway and toxicity criteria for each contaminant.

The exposure factors used in the evaluation were selected to represent a Reasonable Maximum Exposure (RME) for workers. The RME is defined as the highest exposure that is reasonably expected to occur at the site, and the use of the RME represents a conservative approach to evaluating risks. The exposure factors used were a combination of EPA default values and site specific estimates. For example, the respirable dust level was assumed to be equal to the EPA PM10 standard in order to reflect the dust generated by vehicle traffic at the Koppers site.

Table 6-1 lists the toxicity criteria for the contaminants of concern in soils at the Koppers site. For both PCDD/PCDFs and cPAHs, the risks of exposure were calculated using the toxicity equivalent factors (TEF) approach. This approach expresses the toxicity of each compound in terms of the most toxic compound within the group (e.g., the toxicity of PCDD/PCDFs is expressed in terms of 2,3,7,8-tetrachlorodibenzodioxin, or 2,3,7,8-TCDD, equivalents and the toxicity of cPAHs is expressed in terms of benzol(a)pyrene, or B(a)P,equivalents). When the concentrations of PCDD/PCDFs and cPAHs are discussed in this ROD, they are expressed in terms of these toxic equivalents (TEQ).

The resulting RBRGs are shown in Table 6-2. These RBRGs represent the concentration at which each contaminant by itself would pose either a 1 x 10-5 cancer risk or a hazard quotient of one.

For dioxin, the reevaluation of soil remedies was done using a 1 µg/kg cleanup standard for industrial exposures. This level is more stringent than the earlier industrial exposure level recommended by the Centers for Disease Control (5-7 µg/kg) and thus reflects the tentative findings of EPA's recent reassessment of dioxin toxicity.

The site risks associated with ecological receptors were discussed in the original Endangerment Assessment. The primary environmental concern regarding contaminated soils at the site is soil erosion, i.e., migration of contaminated soil or sediment to surface waters. Construction of the drip pads and excavation of highly contaminated soil as part of the 1995 removal action have reduced those risks, although no quantitative assessment has been performed to determine the magnitude of the reduction.

Table 6-1. Toxicity Criteria for Soil Contaminants of Concern

Chemical	Dermal Absorbance	Noncarcinogenic Effects Chronic Reference Dose (RfD)a Oral (mg/kg/day)	Noncarcinogenic Effects Chronic Reference Dose (RfD)a Inhalation (mg/kg/day)	Carcinogenic Effects Slope Factor (SF)b Oral (mg/kg/day)-1	Carcinogenic Effects Slope Factor (SF)b Inhalation (mg/kg/day)-1
Arsenic	0.03	3.00E-04	NA	1.50E+00	1.50E+01
Chromium VI	0.01	5.00E-03	NA	NA	2.90E+02
Carcinogenic PAHs:					
Benzo(a)anthracene	0.1	4.00E-02 (d)	NA	0.1 (c)	0.1 (c)
Benzo(a)pyrene	0.1	4.00E-02 (d)	NA	7.30E+00	7.30E+00 (r)
Benzo(b)fluoranthene	0.1	4.00E-02 (d)	NA	0.1 (c)	0.1 (c)
Benzo(k)fluoranthene	0.1	4.00E-02 (d)	NA	0.01 (c)	0.01 (c)
Chrysene	0.1	4.00E-02 (d)	NA	0.001 (c)	0.001 (c)
Dibenz(a,h)anthracene	0.1	4.00E-02 (d)	NA	1 (c)	1 (c)
Indeno(1,2,3-cd)pyrene	0.1	4.00E-02 (d)	NA	0.1 (c)	0.1 (c)
PCDD/PCDFs	0.03	NA	NA	1.50E+05	1.50E+05
Pentachlorophenol	0.25	3.00E-02	3.00E-02	1.20E-01	1.20E-01(r)

NA - Not Available
a - RfDs were obtained from IRIS, HEAST, ECAO and EPA Region IX
b - Slope factors were obtained from IRIS or HEAST
c - EPA Toxicity Equivalent Factor (TEF) relative to Benzo(a)pyrene
d - Noncarcinogenic health effects of PAHs was evaluated using the oral RfD for naphthalene
r - route extrapolation

Table 6-2. Risk Based Remedial Goals

Chemical	Units	Carcinogenic Effects Target Risk = 1 x 10-5	Noncarcinogenic Effects Target Hazard Quotient = 1
Arsenic	mg/kg	21	379
Total Chromium	"	614*	527,751
cPAHs	"	2.6	27,073
PCP	"	79	10,186

*Calculated using a Cr VI slope factor of 290 (mg/kg-day)-1 and a site-specific Cr VI to Cr III ratio of 1:61.

7.0 DESCRIPTION OF ALTERNATIVES

The 1996 Site-Wide Soils Remedy Report identified and evaluated a variety of alternatives that could be used to clean up contaminated soils at the site. As noted earlier, additional soil sampling has shown that the contaminants (both organic and inorganic) tend to be mixed together throughout the surface soils at the site. Therefore, the 1989 ROD's approach of developing remedial alternatives based on the predominant contaminant(s) in a given area is no longer appropriate. The only distinction among soils that was carried over from the 1989 ROD is between those soils beneath the capped portions of the process area, which cannot be removed without causing major disruption of plant operations, and the remainder of contaminated soil at the site.

Using the RBRGs for industrial site use shown it Table 6-2, the area and volume of contaminated soil and debris that would require cleanup was reassessed. As described below, the resulting area and volume of contaminated soil and debris are about one-half and one-third, respectively, of the 1989 ROD estimates.

In most areas, soil contamination extends to a depth of one foot or less below ground surface. Deeper contamination exists in the areas of the former creosote pond and the former pole washer. There are also areas of contaminated soil and debris not addressed explicitly by the 1989 ROD which are now being included as part of the overall soil cleanup: 1) the drums of debris from the 1987 post-fire cleanup, which are currently stored on site; 2) the soil filter bed, which was part of a wastewater treatment system; and 3) the sediments in the fire pond. The estimated total area of soil to be cleaned up is roughly 22 acres (including the capped process area), and the estimated volume is 100,000 cubic yards (see Figure 7-1).

Soil Cleanup Alternatives

Cleanup alternatives were evaluated in terms of their ability to address the combination of contaminants found in soils and to achieve the RBRGs for industrial use for the Koppers site. The development and screening of treatment and containment alternatives was conducted without attempting to distinguish between principal and low level threat waste. Using the EPA presumptive remedy guidance for wood treater sites and related documents as a guide, a variety of treatment and containment technologies (including those selected in the Koppers 1989 ROD) were screened in order to develop alternatives that would be able to handle both organic and inorganic contaminants. Based on experiences from Koppers and other wood treating sites, there are limited number of alternatives that can be used, particularly for soils contaminated with dioxin. The following cleanup alternatives were evaluated in detail:

1) On-site Incineration - Under this alternative, organic contaminants would be destroyed by burning the soil at high temperatures in an on-site incinerator. The soil is first excavated and screened to removed oversized material, which cannot be treated by incineration. This material (approximately 20% of the original soil volume) would be placed in a new on-site landfill. Following incineration, treated soil would be placed in the landfill if metals exceed the cleanup standard (50% of the treated soil was assumed to fall into this category). The excavated area would be backfilled with clean fill (or treated soil if metals are within cleanup goals). Long-term management includes maintenance of the landfill cover and groundwater monitoring around the landfill. The estimated volume of soil and debris to be placed in the landfill is 60,000 cubic yards.

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2) On-site Thermal Desorption - This alternative deals with soils in a manner similar to incineration (including the landfill for oversized material), except that thermal desorption is the treatment technology, rather than incineration. Screened soil is heated to vaporize the contaminants, and the gases produced during this thermal desorption step are treated to destroy contaminants using an on-site gas-phase incinerator or other technology. Treated soil would be placed in an on-site landfill if metals exceed the cleanup standard. The excavated area would be backfilled with clean fill (or treated soil if metals are within cleanup goals). Long-term management includes maintenance of the landfill cover and groundwater monitoring around the landfill.

3) On-site Landfill - This alternative involves the excavation and placement of contaminated

soil and debris in a hazardous waste landfill to be constructed on the northern portion of the Koppers property. No treatment of the soil would occur before placement. The design of the landfill would be similar to the existing one constructed at the site in 1995. The excavated area would be backfilled with clean imported fill. The landfill would occupy roughly seven acres. Long-term management includes maintenance of the landfill cover and groundwater monitoring around the landfill.

For each of the three alternatives described above, institutional controls would be included as part of the remedy. These controls would consist of deed restrictions which prohibit certain future uses of the property (such as residential development).

Each of the three alternatives would also utilize a Corrective Action Management Unit (CAMU), as defined by RCRA Subtitle C, for the management of soil and debris that contain listed hazardous waste or which themselves exhibit a hazardous waste characteristic. The alternatives would comply with all substantive portions of the CAMU rule as ARARs. Therefore, the CAMU is not subject to the requirements of the RCRA Land Disposal Restrictions (LDRs).

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The section presents a comparison of alternatives according to nine evaluation criteria which are used in the selection of Superfund remedies. Table 8-1 provides a summary of this comparison. Since comments on each alternative were not received form the State of California or the community, the criteria regarding state and community acceptance are not included in the table.

Table 8-1. Comparative Analysis of Alternatives
ALTERNATIVES (all on-site)

	Incineration	Thermal Desorption	Landfill
Description	Soil is burned in an on-site incinerator. Oversized material is placed without treatment in a new on-site landfill. Treated soil with elevated levels of inorganics is also put in the on-site landfill. Estimated landfill volume is 60,000 cubic yards.	Soil is treated in on-site thermal desorption unit. Oversized material is placed without treatment in a new on-site landfill. Treated soil with elevated levels of inorganics is also put in the on-site landfill. Estimated landfill volume is 60,000 cubic yards.	Soil is excavated and placed without treatment in a new hazardous waste landfill to be constructed at the site. Estimated landfill volume is 100,000 cubic yards.
Overall Protection	Reduces risk by destroying organic contaminants in soil and by eliminating exposure to metals as well as organic contaminants in oversized rocks & debris.	Reduces risk by destroying organic contaminants in soil and by eliminating exposure to metals as well as organic contaminants in oversized rocks & debris.	Reduces risk by using engineering controls to eliminate exposure to contaminants in soil & debris.
ARARs Compliance	Complies	Complies	Complies
Long-term effectiveness	Effective as long as landfill cover & institutional controls are maintained	Effective as long as landfill cover & institutional controls are maintained	Effective as long as landfill cover & institutional controls are maintained
Reduction of toxicity, mobility or volume through treatment	Destroys PCP, cPAHs & dioxin in treated soil; toxicity, mobility and volume of arsenic in soil and of all contaminants in oversized rocks & debris are not reduced by treatment.	Destroys PCP, cPAHs & dioxin in treated soil; toxicity mobility and volume of arsenic in soil and of all contaminants in oversized rocks & debris is not reduced by treatment.	Does not reduce toxicity, mobility or volume of contaminated soil through treatment.
Implementability	Process is commercially available. Significant administrative issues likely to be encountered for siting treatment unit. Pilot testing would be necessary.	Process is commercially available, although track record with wood treating sites is limited. Significant administrative issues likely to be encountered for siting treatment unit. Pilot testing would be necessary.	Can be readily implemented. A smaller landfill was recently constructed at the site.

Short-term effectiveness	Incinerator stack emissions must be closely monitored. Vehicular & airborne transport of contaminants during excavation and soil handling are likely hazards. Additional soil handling is required.	Off-gas stack emissions must be closely monitored. Vehicular & air-borne transport of contaminants during excavation and soil handling are likely hazards. Additional soil handling is required.	Vehicular & airborne transport of contaminants during excavation and landfilling are likely hazards. Has the shortest implementation period.
Cost (expressed as	Capital: $82,900,000 30 yr. O&M: $1,200,000 Total: $84.1 million	Capital: $61,400,000 30 yr. O&M: $1,200,000 Total: $62.6 million	Capital: $12,700,000 30 yr. O&M: $1,200,000 Total: $13.9 million

Protection of Human Health and the Environment

All three of the alternatives would achieve overall protection of human health and the environment. Excavation of contaminated soil would be identical for each alternative, resulting in a site-wide average worker exposure risk from residual contamination that is within the acceptable risk range. Under alternative, wastes would remain on-site, with reliance on engineering controls to prevent future exposure.

Compliance with ARARs

All three alternatives would comply with ARARs. The three alternatives are not required to comply with RCRA Land Disposal Restrictions (LDRs) because the alternatives utilize a CAMU for management/disposal of remediation wastes.

Long-term Effectiveness and Permanence

All three alternatives would immobilize contaminants by use of an on-site landfill to permanently dispose of some or all of the contaminated soil. While the treatment alternatives provide a slightly higher degree of permanence, the advantage is limited because neither treatment would reduce the total volume of contaminated material by more than 40%. Oversized soil and debris that cannot be treated by incineration or thermal desorption typically is contaminated with dioxin and therefore cannot be sent to an off-site landfill. Thus, for the treatment alternatives, untreated oversized material and treated material which still contains inorganic contaminants would be placed in an on-site landfill.

The contaminants of concern (particularly dioxin) are relatively immobile in the absence of a solvent, and it is therefore highly unlikely they would leach out of the landfill if the liner should develop a leak. Thus, the long-term effectiveness of each alternatives relies primarily upon maintenance of the landfill cover to prevent direct exposure to contaminants, as well as institutional controls to insure that the property is not developed in the future for residential or other land uses that could result in unsafe exposure to residual contamination. The residual risk of exposure to contaminants and the long-term maintenance requirements would be approximately the same under all three alternatives.

Reduction of Toxicity, Mobility or Volume Through Treatment

Incineration and thermal desorption would provide permanent destruction of organic soil contaminants except for those present on the oversized material (cobbles greater than two inches in size) and the drummed fire debris. These materials are too large to be processed in the treatment units. Neither incineration nor thermal desorption would remove or destroy inorganic contaminants (arsenic and chromium).

Both technologies would reduce the total volume of contaminated soil by about 40%, with the remaining 60% (i.e., 60,000 cubic yards) placed in an on-site landfill. However, this reduction in landfill size would not achieve a corresponding reduction in risk from the presence of an on-site over time. Nor would treatment better achieve the health-based cleanup standards or other remedial objectives at the Site.

Implementability

While incineration and thermal desorption are each commercially available, site-specific treatability studies would be needed to demonstrate their effectiveness and to provide the basis for design of a full-scale system. Significant administrative issues (such as coordination with other regulatory agencies) could make implementations difficult. EPA's experience at other sites has also shown that implementation of thermal destruction alternatives such as incineration of soil or off-gases from thermal desorption units is often met with strong community opposition. Landfill technology previously has been used successfully at the site and is readily implementable.

Short-term Effectiveness

Each alternative presents a limited short-term risk associated with the excavation, transport and handling of contaminated soil. The risks are primarily to workers at the site, with a lesser risk to nearby residents due to potential migration of contaminated dust. In addition, stack emissions from either the incinerator or the thermal desorption alternative's vapor-phase treatment unit pose a potential threat to on-site workers and would have to be closely monitored to insure compliance with air quality standards.

Unlike the landfilling alternative, the treatment alternatives would require a high degree of soil handling both before and after treatment. In addition, the landfilling alternative can be implemented in less time (two years) than the treatment alternatives (three and one-half to six years). Overall, the short-term risks of the landfilling alternative would be lower than the treatment alternatives.

Cost

There are significant differences in cost between the alternatives that include treatment (present worth of $84.1 million for incineration, $62.6 million for thermal desorption) and the landfilling alternative that does not include treatment (present worth of $13.9 million).

Community Acceptance

There were no comments received from the community during the public meeting and no written comments were submitted during the comment period.

State Acceptance

The State of California supports the landfill alternative proposed by EPA as well as the use of the industrial worker exposure scenario for setting cleanup standards. The State's support of the landfill alternative is contingent upon inclusion of adequate deed restrictions and the established of an enforceable long-term operations and maintenance agreement.

9.0 SELECTED REMEDY

9.1 Cleanup Standards

The new soil cleanup standards are presented in Table 9-1. The soil cleanup will be designed to achieve a site-wide excess cancer risk no greater than one in 100,000 (or 1 x 10-5) for industrial workers based on exposure to arsenic, chromium, cPAHs and PCP in surface soils (i.e., soils up to five feet below ground). Because soils at the Koppers site typically contain a mixture of contaminants, the cleanup standard is defined in terms of the combined risk from arsenic, chromium, cPAHs and PCP. For dioxin, the cleanup standard is 1 µg/kg. Achievement of the cleanup standards will lower the overall risk from contaminants at the site to a level considered safe for industrial workers.

Table 9-1. Cleanup Standards for Surface Soil

Contaminant	10-5 Risk Level for Industrial Workers[1]	Cleanup Standard
Arsenic	21 mg/kg	
Chromium	477 mg/kg	Combined Site-Wide Cancer Risk of 10-5
PCP	79 mg/kg	
cPAHs	2.6 mg/kg	
Dioxin	0.24 mg/kg	1 µg/kg

1 From Appendix B of the Site-Wide Soils Remedy Report (March 1996). The concentrations shown represent the level at which the contaminant by itself would present a 10-5 cancer risk to industrial workers.

Based on the results of the Leachability and Degradation Study (contained in Appendix A of the Site-wide Soils Remedy Report), there are only two areas of the site where subsurface soils (i.e., soils deeper than five feet) have the potential to impact groundwater: the former pole washer area and the former creosote pond area (see Figure 7-1). In both areas, the selected remedy involves of the source material. As a result, the objectives of the ESD with respect to this issue (see Section 4.0) will be satisfied, and there is no need to establish separate cleanup standards for subsurface soil.

9.2 Selected Remedial Action

The selected remedial action for contaminated soil and debris is excavation and disposal in an on-site landfill. As described below, approximately 100,000 cubic yards of contaminated soil and debris will be excavated or moved from existing storage locations and placed in a newly-constructed on-site landfill.

Institutional controls consisting of deed restrictions limiting future uses of the site to industrial activities are also part of the remedy. The deed restrictions will prohibit future uses of the property (such as residential development) that are not consistent with the level of protectiveness achieved by the cleanup. Deed restrictions may also include routine maintenance or repair activities of the landfill cover. Deed restrictions shall be set forth in an EPA-approved form running with the land and enforceable against present and future owners of the property.

9.2.1 Soil Excavation Handling

As described in more detail in the 1996 Site-Wide Soils Remedy Report, the locations and approximate volumes of soil and debris to be placed in the landfill are as follows:

Location	Estimated Area (sq ft)	Estimated Volume (cu yd)
Soil Storage Building	na	4,000
Log Drying Areas	240,000	9,000
Process Areas (combined)	400,000	33,000
Creosote pond area	80,000	21,000
Fire pond sediments	40,000	5,000
Pole Washer area	10,000	4,000
Fire Cleanup Debris	na	1,000
Soil Filtration Bed	85,000	15,000
SUBTOTAL	855,000	92,000
Contingency (approx. 10%)	85,000	8,000
TOTAL	940,000	100,000

The RBRGs listed in Table 9-1 will be used as the basis to determine the extent of surface soil excavation. In the wood storage areas, the depth of excavation is expected to be no more than one foot. Soils in the creosote pond area will be excavated to the bottom of the former creosote ponds (estimated average depth is seven feet). Soils in the former pole washer area will be excavated down to a depth of approximately 17 feet in order to remove, to the maximum extent practicable, contaminated soil and perched groundwater that is serving as a continuing source of groundwater contamination in the regional aquifer. All excavated areas will be backed with clean soil.

Soil beneath the capped portions of the process area (defined as the drip pads, secondary containment facilities and permanent facilities shown in Figure 1 of the "Final Design Report, Operable Unit S-3 Cap and Operations and Maintenance Plan, Koppers Company, Inc., Superfund Site (Feather River Plant), Oroville, California," dated March 11, 1994) will continue to be left in place until the soil is accessible, i.e., until wood treating operations cease or process equipment is replaced. When the soil is accessible, the capped area will be remediated to meet the cleanup standards described above. At that time, the soils will be further sampled to determine whether they are principal threat wastes; if so, EPA may require treatment of these soils prior to disposal in an on-site landfill cell.

9.2.2 Landfill Design and Construction

The landfill will be constructed above grade and will occupy approximately seven acres in the northeast portion of the Koppers property. It will be built as an extension of the existing 15,000 cubic yard landfill. Design and operation of the landfill will meet the requirements listed in Section 10.2 below. The time required to construct the landfill cell, excavate and place the contaminated soil and construct the final cover is estimated to be two years (based on two construction seasons). A temporary cover will be placed over the landfill between construction seasons to prevent infiltration of rainfall and generation of contaminated runoff from the landfill cell, as well as to prevent exposure to contaminated soil.

Capital costs for the landfill remedy, including design, permits, construction and soil excavation, are approximately $12.7 million. The present worth of operation and maintenance costs, including groundwater sampling and cap maintenance for 30 years, is approximately $1.2 million.

9.2.3 Corrective Action Management Unit

In issuing this ROD Amendment, EPA designates as a Corrective Action Management Unit (CAMU) the area designated for a landfill under the selected remedial alternative. Accordingly, the CAMU regulation is an ARAR as discussed in Section 10.2 of this ROD Amendment. The approximate size and location of the landfill area is shown on Figure 7-1. The final size and location will be determined during remedial design.

This ROD amendment documents the CAMU designation pursuant to 40 CFR Part 264.552(f), as implemented through the California EPA, Department of Toxic Substances Control, Hazardous Waste Regulations, Title 22, Chapter 14, §66264.552. Hereinafter, the CAMU regulations will be referred to as Title 22, §66264.552. The notice requirements for this ROD amendment shall satisfy public notice requirements under such CAMU regulations.

Without a CAMU, the remedy would require treatment of K001 waste (and, in the future, possibly F032, F034, and F035 wastes) prior to placement in the landfill in order to satisfy RCRA LDRs. The LDR treatment standards are much lower than the cleanup standards for the site. Further, the remedy is designed to be reliable and protective for addressing (via containment only) the risks posed by these listed wastes. The costs and short-term risks associated with adding a treatment component to satisfy LDRs would be unwarranted and unjustified.

In designating the CAMU, EPA has considered the criteria set forth in Title 22, §66264.552 and determined that the CAMU satisfies the following criteria:

- the CAMU will facilitate the implementation of a reliable, effective, protective and cost-effective remedy;

- the management of waste at the designated CAMU will not create unacceptable risk to human health or the environment resulting from exposure to hazardous wastes or hazardous constituents;

- wastes in the CAMU shall be managed and contained to minimize future release, to the extent practicable; and

- the CAMU expedites the timing of remedial activity implementation, when appropriate and practicable; and

- the CAMU, to the extent practicable, minimizes the land area of the facility upon which wastes will remain in place after closure of the CAMU.

The CAMU regulations also provide that the CAMU "shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility." Title 22, §66264.552(c)(3). While the CAMU at the Site will be located in an uncontaminated area, management of waste in this area is more protective than management of the waste at contaminated areas at the Site because it enhances both the short-term and long-term reliability of the remedy for the seasons discussed below.

The CAMU will be located in an area out of the floodplain and adjacent to an existing landfill. The "bottom" of the landfill cell (i.e., soil berms, vadose zone monitoring system and bottom liners) can be constructed in a clean area, thereby eliminating worker exposure to soil contaminants during this phase. Further, contaminated soil will only have to be excavated and transported once (at the time it is placed into the landfill), thereby minimizing the risks of both worker exposure during handling as well as off-site residents' exposure to contaminated wind-borne dust. In addition, limited areas are available for locating a landfill of this size on-Site.[1] Creation of a single contiguous landfill area in an isolated corner of the Site will reduce the possibility of damage to the landfills from ongoing plant operations or future activities at the site, as well as simplifying long-term maintenance of the landfill cover.

EPA also has considered the criteria in subparagraph (6) of Title 22, §66264.552(c) and determined that the concerns expressed in such criteria are inappropriate and/or inapplicable to the Site for the reasons discussed below. The regulations in this subparagraph provide that the CAMU "shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of [remedial] actions by reducing the toxicity, mobility or volume of wastes that will remain in place after closure of the" CAMU. The CAMU landfill will effectively and reliably contain and immobilize the untreated wastes at the Site. As discussed earlier, treatment technologies to reduce toxicity, mobility or volume are not appropriate for the Site. Therefore, in designating this CAMU, EPA has considered this criteria, and determined that it is not a factor for this Site. EPA has determined that the remedy described in this ROD Amendment complies with the requirements set forth in Title 22, §66264.552(e). EPA has made such determination pursuant to its authority to determine compliance with ARARs.

1 The majority of the contaminated soils are located in the currently operating central process area and adjoining wood storage area. Locating the CAMU in this area would not only disrupt the facility, but also pose logistical difficulties for removing the soil and constructing the landfill.

10.0 STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action must comply with applicable or relevant and appropriate environmental standards established under federal and State environmental laws unless a waiver is justified. The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy addresses these statutory requirements and preferences.

10.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment through containment of contaminated soil and debris in an on-site landfill. The landfill will be constructed above grade and will comply with RCRA requirements for hazardous waste landfills. Excavation of surface soils to achieve the soil cleanup standards will ensure that residual contamination does not pose unacceptable risks to workers at the site. In addition, backfilling of excavated areas with clean fill will provide a further measure of protection.

Deed restrictions will prevent any future uses of the site (such as residential development) that would result in unacceptable levels of exposure. There are no short-term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

The primary long term risk posed by the landfill is direct exposure to (i.e., direct contact with) the contaminated material it contains. Exposure is highly unlikely, however, because of the 15 to 55 foot thick berm of clean soil surrounding the lower third of the above-grade landfill and the two and one-half feet of cover material (which includes a flexible membrane liner) over the area above the berm. In addition, the landfill will be surrounded by a chain link fence.

The potential for exposure due to migration of contaminants through a leaking liner and into groundwater that is used for water supply is exceedingly small. The contaminants are currently adsorbed onto soil and debris, including wood fragments. Further, the soil and debris will be placed in the landfill in a relatively dry state (i.e., very low moisture content and no free liquids), with at most only trace levels of solvents (such as diesel fuel). In order for contaminant migration to occur, there would have to be long-term undetected leaks both in the upper liner (to allow sufficient water to enter the landfill cell) and the two bottom liners, as well as the underlying clay layer. Certain contaminants, such as dioxin and cPAHs, are hydrophobic, and their migration would occur only through transport of soil particles along with the water. The landfill design, monitoring systems and maintenance requirements are expected to prevent these conditions from ever developing.

10.2 Compliance with ARARs

Remedial actions selected under CERCLA must comply with all Applicable or Relevant and Appropriate Requirements ("ARARs") under federal environmental law or, where more stringent than the federal requirements, state or state subdivision environmental of facility siting law. Where a State delegated authority to enforce a federal statute, such as RCRA, the delegated portions of the statute are considered to be a federal ARAR unless the State law is broader or more stringent than the federal.

ARARs are generally categorized as follows: (1) chemical-specific requirements, (2) action-specific requirements, and (3) location-specific requirements. Where no ARAR exists for a given chemical, action or location, EPA may consider non-promulgated federal or state advisories and guidance as To Be Considered criteria ("TBC"). Although consideration of a TBC is not required, if standards are selected based on TBCs, those standards are legally enforceable as if the TBC were an ARAR. As the ROD amendment addresses only the soils, no changes are being made to the groundwater remedy ARARs. The selected remedy will comply with ARARs which apply to the soils. These ARARs are summarized in Table 10-1 and described below.

Chemical-specific ARARs are risk-based cleanup standards or methodologies which, when applied to site-conditions, result in the development of cleanup standards for contaminants of concern. No numerically set standards exist for soils under federal or State law.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities because of the special location, which have important geographical, biological or cultural features. Examples of special locations include wetlands, flood plains, sensitive ecosystems and seismic areas. The location-specific ARARs which apply to the landfill are those addressing seismic considerations and floodplains (40 CFR 264.18 as implemented through California EPA Department of Toxic Substances Control, Hazardous Waste Regulations, Title 22, Chapter 14 ("Title 22"), 66264.18).

Action-specific ARARs are technology-based or activity-based requirements or limitations on actions taken to handle hazardous wastes. They are triggered by the particular remedial activities selected to accomplish a remedy.

Selection of a landfill triggers a number of action-specific ARARs which govern design, construction, and operation and maintenance of the landfill. The landfill must meet specified design standards for the liner system, the leachate collection and removal systems, leak detection systems and the final cover. In addition, the State regulations require that the foundation be placed on a foundation or base capable of providing adequate support to prevent liner failure. ARARs also address construction of a run-on control and run-off management system, management of a collection and holding facilities for such systems, control of any wind dispersal of particulate matter from the landfill and preparation of a post-closure plan. In addition, U.S. EPA 1987 Technical Guidance on Bottom Liners and U.S. EPA 1989 Technical Guidance on Covers will be considered in the design and construction of the landfill.

Table 10-1. Applicable or Relevant and Appropriate Requirements

Citation	Requirement
Chemical Specific	
none	
Location Specific	
40 CFR 264.18 as implemented through California EPA, Department of Toxic Substances Control, Hazardous Waste Regulations, Title 22, Chapter 14 ("Title 22") 66264.18.	Requires that new facilities not be located within 61 meters of a fault which has been displaced in Holocene time. In addition, a landfill located in a floodplain must be designed, constructed, operated and maintained to prevent washout by a 100 year flood or must otherwise meet standards designed to withstand such a flood.
Action Specific	
40 CFR 264.301(c) as implemented through Title 22, 66264.301(c)	Design standards for the liner system, the leachate collection and removal systems, and leak detection systems.
Title 22, 66264.301(a)(1)(B)	Requires foundation to be placed on a foundation or base capable of providing adequate support to prevent liner failure.
40 CFR 264.301(g)-(i) as implemented through Title 22, 66264.301(g)-(i)	Construction of a run-on control and run-off management system, management of a collection and holding facilities for such systems and control of any wind dispersal of particulate matter from the land fill.
40 CFR 264.303(a) as implemented through Title 22, 66264.303(a)	During construction, the landfill liner must be inspected to insure that it meets the standards.
40 CFR 264.310(a) as implemented through Title 22, 66264.310(a)	Requirements for the design and construction of the landfill cover.
40 CFR 264.14 as implemented through Title 22, 66264.14	Maintaining security during placement of contaminated soil and debris in the landfill.
40 CFR 264.15 as implemented through Title 22, 66264.15	General requirements for inspection of the landfill during placement of contaminated soil and debris.
40 CFR 264.314 and 264.316 as implemented through Title 22, 66264.314 and 66264.316.	Requirements for management of liquids and containers in the landfill.
40 CFR 264.117 as implemented through Title 22, 66264.117.	Requirements for post-closure maintenance and care of the landfill.
40 CFR 264.118 as implemented through Title 22, 66264.118	Requires written post-closure plan.
40 CFR 264.91(a), 264.94, 264.97 and 264.98 as implemented through Title 22, 66264.91(a), 66264.94, 66264.97 and 66264.98	Requirements for detection and evaluation monitoring, including monitoring of soil pore liquids, to assure that the landfill does not release any contaminants to groundwater.

Table 10-1 (con't). Applicable or Relevant and Appropriate Requirements

Action Specific (con't)

40 CFR 264.303(b) as implemented through Title 22, 66264.303(b)	Requirements for inspections during the time when placement of contaminated soil and debris in a landfill is occurring.
40 CFR 264.552 as implemented through Title 22, 66264.552	Requirements for designating and managing CAMUs.
Butte County Air Pollution Control District Rules 201, 202, 203, & 207	Requirements regarding nuisance conditions, emissions & fugitive dust
40 CFR 6.302(a) and Appendix A; Executive Order 11990	Requirements to avoid or mitigate impacts to wetlands.

During construction, the landfill liner must be inspected to insure that it meets the standards set forth in federal and state standards. ARARs also require maintaining security from the time that contaminated material is first placed in the landfill until the cover is in place. Finally, there ARARs for disposal of liquids and containers in the landfill. Soil remediation work must also comply with emission limits and monitoring requirements issued by the Butte County Air Pollution Control District.

Upon completion and closure of the landfill, there are ARARs addressing maintenance and care of the landfill, detection and evaluation monitoring (including monitoring of soil pore liquids) to assure that the landfill does not release any contaminants to groundwater, and periodic inspections.

As discussed above, this amendment to the ROD designates the landfill as a CAMU pursuant to 40 CFR 552. As a consequence, the K001 waste from the creosote pond may by placed in the landfill without violating any Land Disposal Restrictions (LDRs) that might otherwise apply to such waste. The remainder of the waste is classified under the wood treater listings as F032, F034 and/or F035 waste. LDRs have not been promulgated for such wastes as of the date of this ROD amendment. The selected remedy complies with the ARARs set forth in 40 CFR 552(e).

The Koppers fire pond and its surroundings are a "wet riparian habitat," and the excavation of contaminated soil must comply with federal policies and requirements to avoid, repair or replace impacts to wetlands.

10.3 Cost Effectiveness

Cost-effectiveness is determined by evaluating three of the balancing criteria (long-term effectiveness & permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness) to determine overall effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy cost-effective.

There is not a significant difference in long-term effectiveness among the three alternatives. The area and depth of soil excavation is the same under each alternative, so the residual risk from contamination in these areas does not vary. In addition, each alternative would require an on-site landfill for untreated or partially treated soil and debris. Although the landfill for the treatment alternatives would be somewhat smaller, the residual risks associated with long-term management of the landfills would not vary significantly among alternatives.

The treatment alternatives rank somewhat higher in terms of permanence because they would reduce the volume of waste by approximately 40% through treatment and would provide permanent destruction of organic contaminants in those soils which are treated. However, the treatment alternatives would still leave a substantial volume (60,000 cubic yards) of untreated or partially treated soil and debris that would have to be landfilled at the site.

The treatment alternatives rank lower in terms of short-term effectiveness due to the risks associated with the increased handling of contaminated soils, the possibility if inadequately treated stack-gas emissions, and a longer period of implementation. In terms of overall effectiveness, the benefits of treatment are diminished by the higher short-term risks and the ultimate need to landfill more than half of the initial waste volume. Given these considerations, the landfill alternative is comparable in overall effectiveness to incineration and thermal desorption alternatives.

The estimated total costs of the treatment alternatives ($62.6 to 84.1 million) are at least four times greater than the selected remedy ($13.9 million), with the difference being in capital costs (see Table 8-1). In comparison to the other alternatives, the selected remedy achieves a comparable degree of overall effectiveness at a substantially lower cost and is therefore the most cost-effective alternative.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for soils at the Koppers site. Of the alternatives evaluated, EPA has determined that the selected remedy provides the best balance of tradeoffs in terms of the nine criteria used for remedy selection. In particular, this remedy represents the best balance among long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, implementability, short-term effectiveness, and cost.

While the selected remedy does not result in the destruction of contaminants and therefore does not offer as high a degree of permanence as the incineration or thermal desorption alternatives, it is comparable in terms of long-term effectiveness, in part because all three alternatives rely to some degree on containment within a landfill to prevent exposure to organic and inorganic contaminants. Because the waste material contains only trace amounts of solvents and therefore the contaminants are relatively immobile, the landfill remedy will provide effective containment such that the material can be managed with a high degree of certainty over the long term. The two treatment alternatives would reduce the volume of contaminated soil and debris by only 40%, and each would require a similar (though somewhat smaller) on-site landfill. As described above, the selected remedy ranks higher in terms of short-term effectiveness and will require less time to implement (two years) than either of the treatment alternatives (three and one-half to six years).

The selected remedy ranks highest in terms of implementability, since the technology has already been used successfully at the site. The two treatment alternatives would require pilot tests to demonstrate their effectiveness. While no explicit comments on the use of incineration or thermal desorption were submitted during the public comment period, EPA expects that, based on the history of this site (i.e., the 1987 explosion and fire in the PCP treatment process) and experiences at other sites where thermal treatment has been proposed, there would be significant community opposition to siting such a unit for treating dioxin-contaminated material.

10.5 Preference for Treatment as a Principle Element

The selected soil remedy uses containment, rather than treatment, to address the threats posed by contaminated soil and debris. Incineration and thermal desorption, the two treatment alternatives carried through the detailed analysis, are theoretically capable of destroying dioxin, although treatability studies would be necessary to demonstrate the effectiveness of either alternative. As noted above, it is highly unlikely that EPA would be successful in getting community acceptance of an on-site thermal treatment unit for dioxin-contaminated soil. In screening treatment alternatives, EPA also considered the possibility of sending the soil to an off-site commercial incinerator, but the treatment costs for 100,000 cubic yards (i.e., 150,000 tons) of soil are prohibitive. EPA therefore has concluded that treatment of the total waste volume via incineration or thermal desorption would not be practicable.

Based on treatability studies at Koppers and other wood treater sites, fixation is an alternative treatment process that is potentially effective for immobilizing the contaminants in the soil and could be implemented at the site. Although this technology would result in further reduction of contaminant mobility, it would not reduce the toxicity of the contaminants per se, nor would it reduce the volume of contaminated material (in fact, the volume of treated material would be greater than the original volume). The net result would be an incremental reduction in mobility (for a waste whose primary contaminant of concern, dioxin, is relatively immobile to start with) at a cost that is equal to or greater than landfilling. Placement of the soil and debris in the on-site landfill will be equally effective in eliminating the threat of direct exposure and reliably reducing mobility. EPA therefore has concluded that treatment via fixation of the waste would not offer a significant added benefit to the selected soil remedy.

Since the vast majority of the total waste volume can be classified as low level threat waste, for which containment is an appropriate remedy, EPA also considered whether treatment of only the principal threat wastes (i.e., the former creosote pond sediments) was practicable. For these sediments, the implementability of on-site thermal treatments is equally low, and the cost of off-site incineration for the estimated 2,000 cubic yards of this material would be at least $9 million. EPA therefore has concluded that treatment via incineration or thermal desorption of this potential principal threat waste would not be practicable.

The limitations of fixation as a treatment option for the pond sediments are similar to those described above - no reduction in toxicity, an increase in volume of material, and the minimal benefits of further reducing the mobility of a relatively immobile contaminant. Again, placement of the pond sediments in the on-site landfill will be equally effective in eliminating the threat of direct exposure and reliably reducing mobility. EPA has therefore concluded that treatment via fixation of this potential principal threat waste would not offer a significant added benefit to the selected soil remedy.

In summary, the selected soil remedy does not satisfy the statutory preference for treatment; however, the groundwater cleanup underway at this site does continue to use treatment as a principal element of the remedy

11.0 DOCUMENTATION OF SIGNIFICANT CHANCES

The Proposed Plan for revising the soil remedy at the Koppers site was released for public comment in March 1996. EPA's preferred alternative, excavation and disposal in an on-site landfill based on continued industrial use of the site, was documented in the Plan. EPA did not receive any written or verbal comments on the Proposed Plan during the public comment period. In the absence of public comments and/or any new information regarding remedial alternatives or site characteristics, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

The Proposed Plan did not discuss the designation of a CAMU as a common element among all alternatives, nor was it specified as part of the proposed remedy. However, the use of a CAMU designation for the landfill area does not materially change the nature of the remedy. EPA has decided to designate a CAMU in order to facilitate implementation of a remedy that would otherwise be precluded by a RCRA regulatory impediment.

III. RESPONSE SUMMARY

1.0 INTRODUCTION

The United States Environmental Protection Agency ("EPA") held a public comment period from April 2 through May 2, 1996 on EPA's Proposed Plan for revisions to the soil cleanup remedy at the Koppers Company, Inc. ("Koppers") Superfund Site in Oroville, California. The purpose of the comment period was to provide interested parties with an opportunity to comment on the Proposed Plan and related documents prepared since the 1989 Record of Decision for the Koppers site. The Proposed Plan and other documents comprising the Administrative Record were made available on April 2, 1996 at the Butte County Public Library in Oroville and at the Meriam Library, California State University at Chico. By April 2, 1996, fact sheets containing EPA's Proposed Plan had been mailed to all interested parties. Notification of the public comment period was published in the Chico Enterprise-Record newspaper.

EPA held a public meeting on April 16, 1996 at the Oakdale Heights School in Oroville, California. At this meeting, EPA representatives described the alternatives evaluated, presented EPA's preferred alternative and answered questions about the evaluation of the Koppers site and the remedial alternatives under consideration.

Section 113(k)(2)(B)(iv) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") requires that EPA to significant comments on the Proposed Plan.

2.0 SUMMARY OF COMMENTS AND AGENCY RESPONSES

During the April 2 - May 2, 1996 public comment period, EPA did not receive any verbal or written comments on the Proposed Plan. In a telephone conversation with a City of Oroville official toward the end of the comment period, EPA's Remedial Project Manager was told that the City had no objections to EPA's proposed change in the soil remedy.

In December 1995, EPA issued a fact sheet describing its ongoing reevaluation of soil remedies. This fact sheet, which was mailed to all interested parties, described both the reconsideration of future land use scenarios for the site and the reevaluation of remedial alternatives for soils. The results of the bioremediation, soil washing and fixation treatability studies were discussed in the fact sheet. In addition, incineration, thermal desorption and landfilling were presented as technologies being considered to replace the unsuccessful innovative treatment technologies. The fact sheet encouraged the public to contact EPA with any comments or ideas regarding the reevaluation of soil cleanup.

Shortly after the fact sheet was issued, EPA's Remedial Project Manager met with elected officials and staff for both Butte County and the City of Oroville to discuss the reevaluation of soil remedies and solicit any comments they had on the issue. No specific concerns were expressed during those meetings, and representatives from the City's planning department indicated that continued industrial use of the site was consistent with the City's long-range plans for the area. Two drop-in sessions for the public were also held in Oroville, and no specific concerns or objections were raised during those lightly-attended sessions.

In a letter dated May 9, 1996, the State of California, through the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) concurred with the proposed remedy on the condition that adequate deed restrictions and operations and maintenance (O&M) controls (as described in the letter) be included in the remedy. The selected remedy includes deed restrictions, which will be developed to incorporate DTSC's requested provisions. EPA will be amending the consent decree with Beazer to include enforceable O&M requirements for the landfill.